Information Bulletin

Grade 6 Science 1996-97

Students First!
Student Evaluation

Alberta
EDUCATION

This document was written primarily for:

Students	✓
Teachers	✓
Administrators	✓
Parents	
General Audience	
Others (Specify)	✓ Superintendents

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This bulletin contains general information about the Provincial Student Assessment Program and information specific to the Grade 6 Science Achievement Test. **It replaces all previous bulletins.**

October 1996

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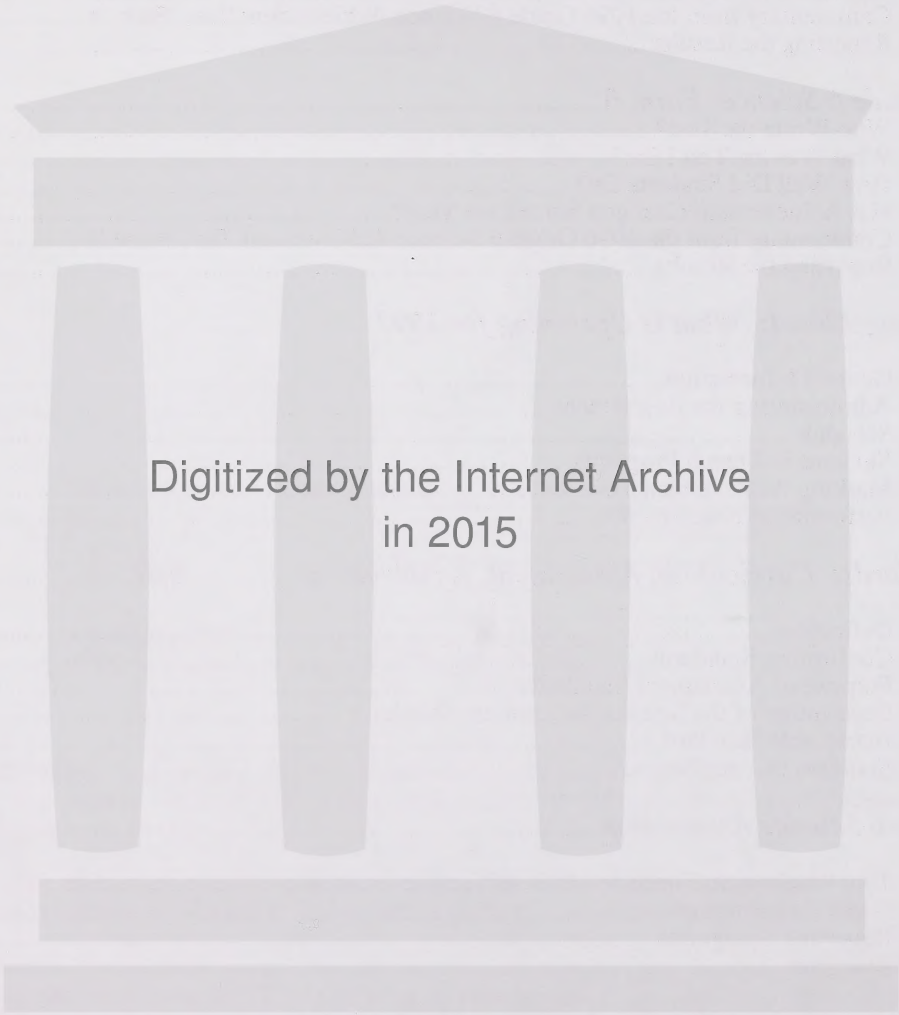
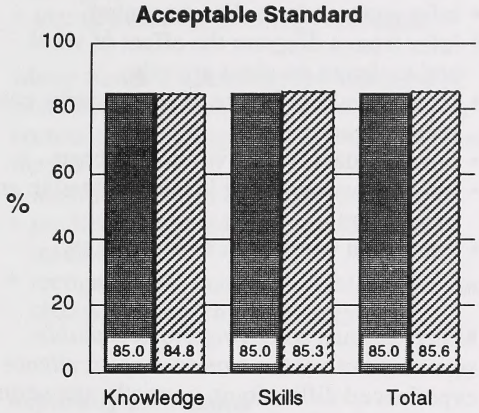
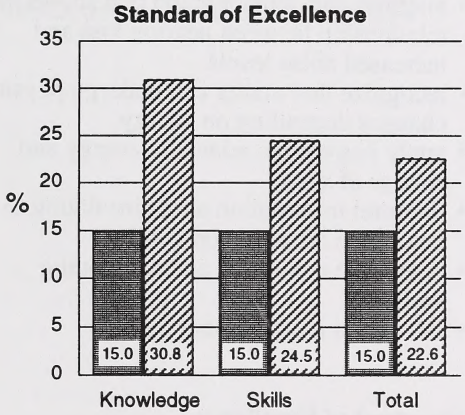


Looking Back: Highlights of 1996

Grade 6 Science: Form A

This information provides teachers, school administrators, and the public with an overview of the results for Form A of the June 1996 Grade 6 Science provincial assessment. It complements the detailed school and jurisdiction reports.





*the percentage of students in the province expected to meet the acceptable standard and the standard of excellence

** the percentage of students in the province who met the standards (based on those who wrote)

Who Wrote the Test?

Students registered in Grade 6 and receiving instruction on the Elementary Science *Program of Studies* (Revised 1986), were expected to write Form A of the 1996 Science assessment. A total of 23 480 students completed this assessment. In 1996, only a small proportion of those students in Grade 6 who were expected to write Form A did not write the test: 2.9% of students were absent and 3.5% of students were excused from writing by their superintendent.

What Was the Test Like?

The assessment instrument had 50 multiple-choice questions in three topic areas: Matter and Energy, Living Things and Environment, and Earth, Space, and Time. Two learning components were assessed: Knowledge (16 questions) and Skills (34 questions). Students recorded their responses to questions on a separate answer sheet.

How Well Did Students Do?

As shown by the graphs, the number of students achieving the *acceptable standard* was as expected. The number of students achieving the *standard of excellence* was higher than expected in both the knowledge and skills components of the test.

In 11.0% of the schools, the percentage of students achieving the *acceptable standard* was significantly above expectations for the province. In 75.8% of the schools, the percentage was not significantly different from provincial expectations. In 13.3% of

schools, the percentage of students meeting the *acceptable standard* was significantly below provincial expectations. Schools where fewer than five students wrote the Grade 6 test are not included in these school calculations.

The results presented in this material are based on scores achieved by all students who wrote Form A, except those who wrote the French translation of the test. Results for these students are reported separately.

Has Achievement Changed Since Last Year?

A comparison of the results on the common items appearing on both the 1995 and 1996 tests shows that student achievment has increased very slightly. In 1995, the provincial average on the 29 common items was 20.0. In 1996, the provincial average on the 29 common items was 20.5.

Commentary from the 1996 Grade 6 Science Achievement Test, Form A

Sample questions from the assessment and accompanying discussion provided to highlight the knowledge and skills demonstrated by students achieving the *acceptable standard* and the *standard of excellence* will **not** be included this year. This is a result of a decision to readminister the 1996 Science Achievement Test Form A for students speaking French who are not yet taking the revised Grade 6 Science course. However, descriptions of what students achieving standards did well, and not so well, are provided.

Acceptable Standard

Overall, results show that most students who met the *acceptable standard* but not the *standard of excellence* were able to

- interpret the relationship between predator and prey population cycles
- identify the interactions and relationships of a food chain in an environment
- infer possible effects of changes that may occur in an ecosystem
- use observations to infer that a river meanders more as it gets older
- identify variables that cause changes in sound
- infer patterns from data presented
- infer from a diagram the effect of wind and moisture on plant growth
- infer that effective use of solar energy can reduce heating costs
- interpret data from a wind-chill chart
- infer the variable that is manipulated in an experiment
- interpret a word chart to identify an organism

Many students achieving the *acceptable standard* but not the *standard of excellence* experienced difficulty in correctly answering questions that required them to

- identify methods to conserve energy
- interpret data from a graph that shows the relationship between hearing loss and increased noise levels
- recognize that matter can undergo physical changes depending on energy
- apply knowledge related to energy and change of state
- interpret information about insulation to determine the effect on cooling
- determine controlled and responding variables
- infer from measurement data

Standard of Excellence

Students who met the *standard of excellence* demonstrated more success than did other students. In addition to the successes identified for students achieving the *acceptable standard*, many students performing at the *standard of excellence*, specifically, could

- recall that the Sun is the principal energy source
- classify using a dichotomous key
- infer the relative hardness of rocks
- interpret data using energy use

- predict the path of electricity in a simple circuit
- distinguish variables to be controlled in an investigation
- infer the classification of an anthropod based on a sample key
- infer patterns from information presented in a graph
- identify renewable energy resources

Many students achieving the *standard of excellence* experienced some difficulty in correctly answering questions that required them to

- identify methods to conserve energy
- predict the variables controlled in an investigation
- recognize that matter can undergo physical changes depending on energy

Reporting the Results

On August 23, 1996, each school jurisdiction received, electronically, a district report and individual school reports regarding their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

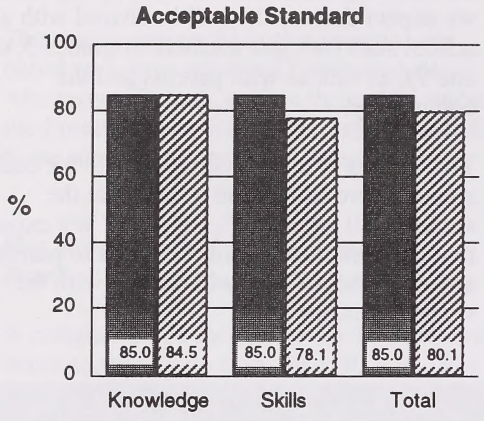
To facilitate reflection on school programs, we expect that results will be shared with all school staff (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

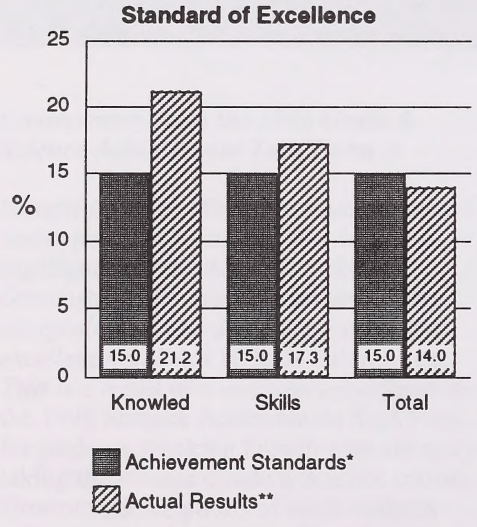
Two copies of an individual profile for each student were sent to the school that the student will attend in September. We expect that the Parent Copy will be given to parents and the School Copy will remain with the student's record.

All Achievement Tests administered in 1993 and prior to 1993 are no longer secured.

Grade 6 Science: Form B

This information provides teachers, school administrators, and the public with an overview of the results for Form B of the June 1996 Grade 6 Science provincial assessment. It complements the detailed school and jurisdiction reports.





*the percentage of students in the province expected to meet the acceptable standard and the standard of excellence

** the percentage of students in the province who met the standards (based on those who wrote)

Who Wrote the Test?

Students registered in Grade 6 and receiving instruction on the *Revised Elementary Program of Studies, May 1996*, were expected to write Form B of the 1996 Science assessment. A total of 14 759 students completed this assessment. In 1996, only a small proportion of students in Grade 6 who were expected to write Form B did not write the test: 1.6% of students were absent and 2.1% of students were excused from writing by their superintendent.

What Was the Test Like?

The assessment instrument had 50 multiple-choice questions in five topic areas: Inquiry and Problem Solving, Aerodynamics and Flight, Sky Science, Evidence and Investigation, and Trees and Forests. Two learning components were assessed: Knowledge (15 questions) and Skills (35 questions). Students recorded their responses to questions on a separate answer sheet.

How Well Did Students Do?

As shown by the graphs, the number of students achieving the *acceptable standard* was less than expected. The number of students achieving the *standard of excellence* is higher than expected in both the knowledge and skills components of the test but lower than expected on the total test.

In 5.5% of the schools, the percentage of students achieving the *acceptable standard* was significantly above expectations for the province. In 66.8% of the schools, the percentage was not significantly different from provincial expectations. In 27.8% of schools, the percentage of students meeting

the *acceptable standard* was significantly below provincial expectations. Schools where fewer than five students wrote the Grade 6 test are not included in these school calculations.

The results presented in this material are based on scores achieved by all students who wrote Form B, except those who wrote the French translation of the test. Results for these students are reported separately.

Has Achievement Changed Since Last Year?

A comparison of the results on the common items appearing on both the 1995 and 1996 tests shows that student achievment has remained the same. In 1995 and 1996, the provincial average on the 14 common items was 10.3.

Commentary from of the 1996 Grade 6 Science Achievement Test, Form B

Sample questions from the assessment and accompanying discussion provided to highlight the knowledge and skills demonstrated by students achieving the *acceptable standard* and the *standard of excellence* will **not** be included this year. This is a result of a decision to readminister the 1996 Science Achievement Test, Form A for students speaking French who are not yet taking the revised Grade 6 Science course. However, descriptions of what students achieving standards did well, and not so well, are available.

Acceptable Standard

Overall, results show that most students who met the *acceptable standard* but not the *standard of excellence* were able to

- interpret the relationship between predator and prey population cycles
- use observations to infer that a river meanders more as it gets older
- infer that effective use of solar energy can reduce heating costs
- interpret data from a wind-chill chart
- infer the variable that is manipulated in an experiment
- interpret a word chart to identify an organism
- predict the interrelationships between living things
- observe and interpret growth patterns of trees
- make appropriate interpretations from observations

Many students achieving the *acceptable standard* but not the *standard of excellence* experienced difficulty in correctly answering questions that required them to

- identify major components of an aircraft
- predict outcomes of air movement across a surface
- recognize that the sun and stars emit light
- order the phases of the moon
- identify technologies and procedures used to gain knowledge about the night sky
- infer that oxygen is a component of air that is necessary for rusting
- apply knowledge of fabrics to classify a sample
- observe and classify fingerprints to match a given sample

Standard of Excellence

Students who met the *standard of excellence* demonstrated more success than did other students. In addition to the successes identified for students achieving the *acceptable standard*, many students performing at the *standard of excellence*, specifically, could

- classify using a dichotomous key
- infer the relative hardness of rocks
- predict variables to be controlled in an investigation
- recognize that streamlining reduces drag
- recall that living things that fly need lift to overcome gravity
- identify design changes of a parachute to improve the effectiveness of the design

- identify reasons why trees and forests are valued
- interpret data from a chart to make an inference
- recall that planets further from the Sun receive less sunlight
- infer the Sun's position from a graph
- infer that rusting causes metal to change composition and cannot be reversed
- identify variables that cause changes in sound
- interpret events from evidence shown

Many students achieving the *standard of excellence* experienced some difficulty in correctly answering questions that required them to

- state the design that allows a model plane to turn right or left
- select a design to allow a model to fly further
- predict the growth patterns of trees
- predict phases of the moon based on the relative positions of the Sun and Earth

Reporting the Results

On August 23, 1996, each school jurisdiction received, electronically, a district report and individual school reports regarding their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staff (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

Two copies of an individual profile for each student were sent to the school that the student will attend in September. We expect that the Parent Copy will be given to parents and the School Copy will remain with the student's record.

All Achievement Tests administered in 1993 and prior to 1993 are no longer secured.

Looking Ahead: What is Upcoming for 1997

General Information

The Provincial Student Assessment Program provides teachers, parents, students, school administrators, Alberta Education, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas at Grade 3—language arts and mathematics—and in four subject areas at grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards, which reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing and field testing the assessment instruments.

Administering the Assessment

Information about the nature of the provincial assessments as well as their administration to special needs students can be found in the *General Information Bulletin, Provincial Student Assessment Program,* which is mailed each fall to all superintendents and principals.

Schedule

The written-response component of English and French Language Arts will be administered during the last week of May. The machine-scorable component of all achievement tests will be administered during the last two weeks of June. Specific information regarding scheduling is provided in the current *General Information Bulletin, Provincial Student Assessment Program.*

To minimize any risks to security, we recommend that all students complete the test on the same day. Superintendents approve a local schedule for achievement test administration within the dates provided. Students who are absent when the tests are administered and who return to school by the end of the school year must write the tests upon their return. By scheduling the tests early in the administration period most, if not all, absentees can be tested upon their return to school. The principal is responsible for ensuring the security of the tests.

The tests that will be administered each year are:

Grade 3
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Mathematics (English and French forms)

Grade 6
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Français 6^{e} année (*Partie A: Production écrite* and *Partie B: Lecture*)
Mathematics (English and French forms)
Science (English and French forms)* see p. 8
Social Studies (English and French forms)

Grade 9
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Français 9^{e} année (*Partie A: Production écrite* and *Partie B: Lecture*)
Mathematics (English and French forms)
Science (English and French forms)
Social Studies (English and French forms)

Students in French Programs

All students in French programs must write English Language Arts, French Language Arts, and French versions of other achievement tests if their language of instruction is French. Alberta Education will send a checklist to schools in January requesting an indication of how many

English or French tests are required. These forms must be returned through jurisdiction offices by mid-February.

* Resources for the implementation of the revised Program of Studies for elementary science will not be available until the 1997–98 school year. Therefore, implementation of the revised Program of Studies for students in French programs is optional for the 1996–97 school year. Schools offering grade 6 science in French must decide which form of the science test they will write in June 1997. The choices are either the translated form of the 1996 Grade 6 Science Achievement Test based on the previous program or the 1997 Grade 6 Science Achievement Test based on the revised program. Schools offering Grade 6 Science in French must choose one form or the other for all students in Grade 6 writing in French.

Marking Achievement Tests Locally

Teachers are able to mark the tests before returning them to Alberta Education. Teachers can use the results as part of an individual student's year end assessment, as well as for planning instruction.

Performance Assessments

Performance assessments provide students with real-life tasks. These assessments address many of the learner expectations that cannot be easily measured using only paper and pencil strategies. These tasks have been developed by classroom teachers and are designed to model good classroom instruction and assessment practices.

The Student Evaluation Branch uses these tasks to collect a broader base of information about what students know and can do than achievement tests alone can provide. These assessments will be administered to a provincial sample of students in all subjects on a rotating basis. The following assessments will be given in 1997:

Grade 3
- informational book tasks in language arts

Grade 6
- social studies: inquiry into basic needs

Grade 9
- problem-solving and communication tasks in science

Standards: Curriculum, Assessment, Achievement

The move toward results-based curricula has re-emphasized the need for a clear delineation of standards and their purpose. All standards and all methods of setting standards require judgement. Local targets are also dicussed in this section.

> The process of setting a standard can only be as good as the judgements that go into it. The standard will depend on whose judgements are involved in the process. In this sense, all standards are subjective. Yet once a standard has been set, the decisions based on it can be made objectively. Instead of a separate set of judgements for each test-taker, you will have the same set of judgements applied to all test-takers. Standards cannot be objectively determined, but they can be objectively applied.[1]

Definitions

The Achievement Testing Program is directly concerned with three different but related standards. These provincial standards are curriculum standards, assessment standards, and achievement standards.

- **Curriculum Standards** are the expected student learnings sequenced into grade levels. They include broad statements of knowledge, skills, and attitude expectations against which student performance is judged. These standards are established in the process of curriculum development and are found in the *Program of Studies* document produced for each subject.

- **Assessment Standards** are the criteria adopted for judging actual student achievement relative to curriculum standards. They are ultimately expressed and applied to test scores. They are derived from answers to questions such as: What scores must a student obtain or how many questions on a given test must a student answer correctly in order for his/her performance on the test to be judged as acceptable or excellent? For the Achievement Testing Program, the provincial assessment standards are 80% for the *standard of excellence* and 50% for the *acceptable standard.*

- **Achievement Standards** are judgements that specify what percentages of students are expected to achieve an acceptable and an excellent level of performance in relation to each course of studies, i.e., the relevant curriculum standards. It is important to point out that this judgement is not a prediction of the percentage of students who will actually achieve acceptable or excellent levels of performance, but rather a specification of the percentage of students at a given grade or year in school who are *expected* to achieve the acceptable (85%) or excellent standard (15%). **The 85% of students expected to meet the *acceptable standard* includes those students who meet the *standard of excellence*.** These standards apply to school, jurisdiction, and provincial performance.

- **Local targets** are goals set in schools/districts to focus plans for helping students learn what is expected by the provincial government. These local targets reflect the specific needs of students, the views of teachers, school administration, and the local community, and the resources available to provide learning opportunities for students.

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[1] Passing Scores; Samuel A. Livingston, Michael J. Zieky; Educational Testing Service, 1982.

Confirming Standards

Confirming standards is a process in which some teachers are asked to make judgements about the achievement test to answer the question of whether province-wide performance is good enough. For more information on the confirming standards process, refer to the *Provincial Student Assessment Program Provincial Report, June 1993 Administration*. For information on the selection of teachers for participation in the confirming standards process, refer to the current *General Information Bulletin, Provincial Student Assessment Program.*

Purpose of Assessment Standards

The provincial standards are the basis upon which we assess how well students have learned science by the end of Grade 6. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial Standards are useful, therefore, for assessing Grade 6 students in all types of school programs—public, private, and home education. By comparing actual results to provincial standards, decisions can be made about whether achievement is in fact "good enough."

Description of the Science Assessment Standards

The following statements describe what is expected of Grade 6 students who are meeting the *acceptable standard* or the *standard of excellence* on independent work at the end of the Grade 6 Science program. The statements represent the standards against which student achievement will be measured.

Acceptable Standard

Skills—Students who meet the *acceptable standard* in Grade 6 Science design and carry out an investigation in which variables are identified and controlled, and which provide a fair test of the question being investigated. They recognize the importance of accuracy in observation and measurement, and apply suitable methods to record, compile, interpret, and evaluate observations and measurements. They also design and carry out an investigation of a practical problem involving the construction or modification of a device that moves through air, and they develop a possible solution.

Knowledge—Students who meet the *acceptable standard* describe the properties of air and the interactions of air with objects in flight. They construct devices that move through air, and identify adaptations for controlling flight. These students observe, describe, and interpret the movement of objects in the sky, and identify pattern and order in these movements. They apply knowledge of the properties and interactions of materials to an investigation and identification of a material. They also describe characteristics of trees and the interaction of trees with other living things in the local environment.

Attitudes—Students achieving the *acceptable standard* demonstrate positive attitudes for the study of science and for the application of science in responsible ways.

Standard of Excellence

Skills—Students who meet the *standard of excellence* in Grade 6 Science design, carry out, and evaluate an investigation in which variables are identified and controlled with ease. The investigation provides a fair test of the question being investigated and the student readily identifies new questions that may also be explored. They are accurate in making observations and measurements; apply novel methods to record, compile, interpret, and evaluate observations and measurements. They also design, carry out, and evaluate an investigation of a practical problem involving the construction or modification of a device that moves through air, and develops a workable solution.

Knowledge—Students who meet the *standard of excellence* describe in detail the properties of air and the interactions of air with objects in flight. They construct aerodynamic devices that move through air, and identify and make adaptations for controlling flight. These students observe, make detailed descriptions and accurate interpretations about the movement of objects in the sky, and identify specific patterns order of these movements. They apply knowledge of the properties and interaction of materials with precision. They provide clear descriptions of the characteristics of trees and the interaction of trees with other living things in the local environment.

Attitudes—Students achieving the *standard of excellence* demonstrate positive attitudes for the study of science and for the application of science in responsible ways. They demonstrate a confidence in their personal ability to learn and develop problem-solving skills, perseverance in the search for understanding, and a critical-mindedness, in examining evidence and determining what the evidence means.

Grade 6 Science Assessment

The Grade 6 Science assessment measures the overall growth in student learning through the elementary science program with particular emphasis on Grade 6.

Two Assessment Forms for 1996–97

For 1996–97 school year, there will be two assessment forms for Science 6. One form reflects the current Grade 6 Science learning expectations based on the *Revised Elementary Program of Studies, May 1996*. The second form reflects the learning expectations based on the previous *Elementary Science Program of Studies* (Revised 1986). The second form will be available only for schools where French Immersion students or Francophone students have received instruction in the 1986 program in French. French Immersion and Francophone schools will be required to commit to only one form of the assessment. An exception will be made for schools offering instruction in both French and English, in which case a different version may be requested for each program. In January, principals will be requested to indicate which form of the assessment will be required for administration in June.

Note: Special provision test forms will only be available for the current revised science program.

General Description

The assessment instruments consist of 50 multiple-choice questions, with 20 of the questions common to both forms. Students will record their answers on a separate answer sheet. The assessment is designed to be completed in 60 minutes. However, additional time of up to 30 minutes may be provided to allow students to finish.

Students will need HB pencils, erasers, and scrap paper. Calculators are not required for successful completion of the assessment but are permitted.

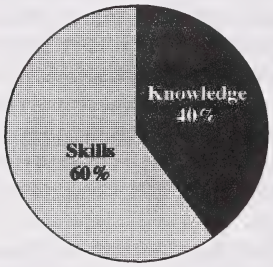
Note: For information related to the Grade 6 Science Achievement Test based on the previous *Elementary Science Program (Revised 1986)*, refer to the *Grade 6 Science Information Bulletin, 1995–96.*

Reporting Categories

The assessment is limited to those areas of learning that may be efficiently assessed using paper and pencil.

The learning components and skills are integrated in the assessment. The knowledge component includes the fundamental understanding of concepts and processes of science. The skills component refers to the application of knowledge. The following circle graph shows the

approximate emphasis for the reporting categories of knowledge and skills.



Questions for the assessment based on the current expectations for Grade 6 Science will have the context drawn from:

1. Air and Aerodynamics
2. Flight
3. Sky Science
4. Evidence and Investigations
5. Trees and Forest

Blueprint

The emphasis for the achievement test is based on the current learning expectations is presented in the blueprint.

Expectations	Number of Questions (Percent)	Learning Components Number of Questions (Percent)	
Students will be expected to:		**Knowledge**	**Skills**
Work cooperatively with others to design and carry out an investigation in which variables are identified and controlled; recognize the importance of accuracy in observation and measurement, and apply suitable methods to record, compile, interpret, and evaluate observations and measurements gathered by self and group; work cooperatively with others in designing and carrying out an investigation of a practical problem and in developing a possible solution	14 (28)	2 (4)	12 (24)
Describe properties of air and the interactions of air with objects in flight; construct devices that move through air; identify adaptations for controlling flight	14 (28)	9 (18)	5 (10)
Observe, describe, and interpret the movement of objects in the sky; identify pattern and order in these movements	7 (14)	4 (8)	3 (6)
Apply observation and inference skills to recognize and interpret patterns, to distinguish a specific pattern from among a group of similar patterns and to apply a knowledge of the properties and interactions of materials to the investigation and identification of a material sample	6 (12)		6 (12)
Describe characteristics of trees and the interaction of trees with other living things in the local environment	9 (18)	5 (10)	4 (8)
Total	50 (100)	20 (40)	30 (60)

Note: Some contexts may also be drawn from learnings accumulated through grades 4, 5, and 6.

Preparing Students for the Assessment

We hope that teachers share the following information with their students to help them prepare for the science assessment.

- Talk with your students about some of the positive and negative aspects of taking tests. Share some of your own experiences and have your students share theirs.

- Familiarize your students with the format of the achievement assessment and the kinds of questions that will appear on it by having them work through the sample questions.

Suggestions for Answering Multiple-Choice Questions

The questions in the achievement assessment are integrated in real-life contexts. Frequently, a number of questions may be clustered around a common context.

Students should use other information given for answering questions by:

a. reading the information and thinking carefully about it before trying to answer any of the questions that need the information OR

b. reading the questions first and then reading the information, keeping in mind the questions they need to answer

When information is given for more than one question, students should go back to the information before answering each question.

Students must make sure they look at all forms of information given. Information may be given in words, charts, pictures, graphs, and maps.

Students should choose the answer they think is best. If they don't see a correct or best answer right away, they are encouraged to find the two choices that seem closest to the correct answer and pick one of them for the answer.

Practice Questions

The following practice questions reflect the nature and complexity of the questions that will appear on the Grade 6 Science Achievement Test.

We encourage teachers to familiarize students with the assessment by having them work through these practice questions. Please note that this collection of practice questions has **NOT** been used on previous achievement tests but may be used with students. Other items from previous tests remain secured (see *General Information Bulletin*). The questions do not necessarily represent the assessment emphasis as presented in the blueprint.

There are 18 practice multiple-choice questions. A table of the key and descriptors for the sample questions is found on page 29.

It was the beginning of Daryl's and Cassandra's spring vacation and the family had to travel to Calgary to catch an airplane to Victoria, B.C. The family got up at 3:00 A.M. When Cassandra left the house, she looked up at the night sky.

1. Cassandra briefly saw a bright streak of light as it moved quickly across the sky. Cassandra **most likely** saw a

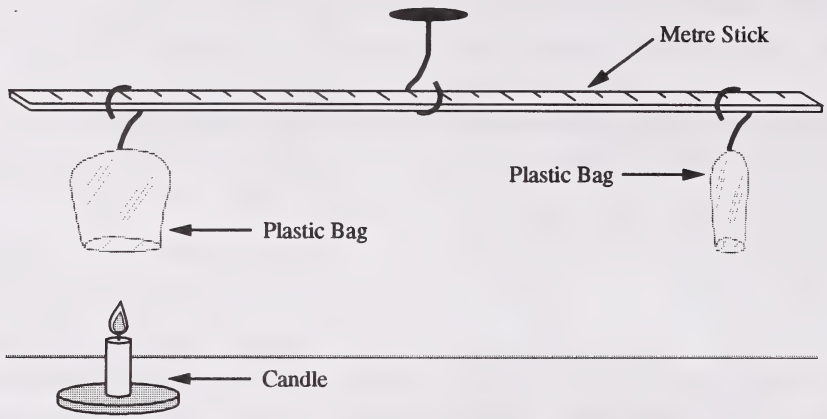
A. satellite
B. comet
C. meteor
D. meteorite

2. As the family approached Calgary, they observed several hot-air balloons in the sky over the city. Daryl asked his Dad, "What makes those balloons rise?" His father **correctly** explained that air

A. is a fluid
B. rises when heated
C. can be compressed
D. exerts pressure in all directions

Use the following information to answer question 3.

Daryl recalled a classroom experiment that involved the heating of air.



3. Daryl observed that after the candle was lit, the meter stick

A. rotated clockwise
B. moved to the right
C. rose away from the candle
D. remained still

Use the following information to answer question 4.

Cassandra then recalled a classroom investigation where she learned that air can be compressed. She dropped different air-filled balls to test for compressibility.

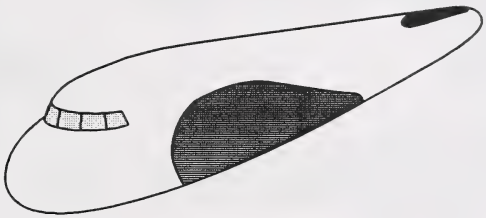
4. When testing the balls for compressibility, the two variables that Cassandra kept constant were the

A. amount of air in the ball and colour of the ball
B. amount of air in the ball and the height from which they were dropped
C. type of material of the ball and the height from which they were dropped
D. type of material of the ball and colour of the ball

When the family arrived at the airport, the Sun was just rising. They met a friend of Cassandra's and Daryl's mother who took them all on a brief tour of an airplane hangar. They saw several airplanes under repair or being serviced.

Use the following information to answer question 5

Cassandra and Daryl watched mechanics repairing an airplane in the hanger. They saw this part of the airplane.

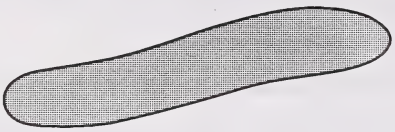


5. Cassandra and Daryl saw the

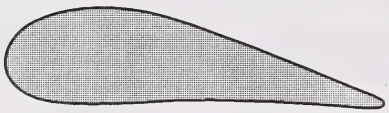
A. wing assembly
B. horizontal stabilizer
C. fuselage
D. vertical stabilizer

6. Cassandra knows that the shape of an airplane's wing produces lift. Which of the following wing shapes would produce maximum lift?

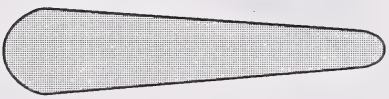
A.

Front  Back

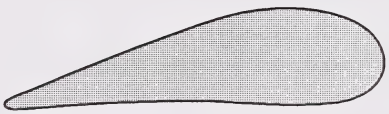
B.

Front  Back

C.

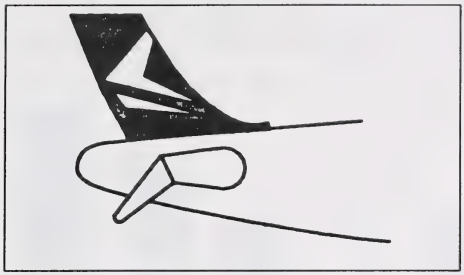
Front  Back

D.

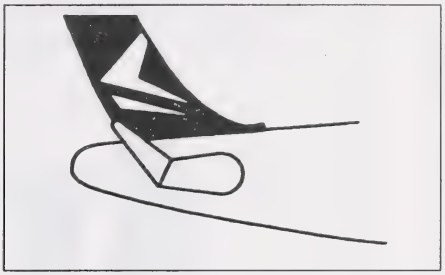
Front  Back

7. Which picture of an aircraft's horizontal stabilizer shows the position that would enable the plane to climb?

A.

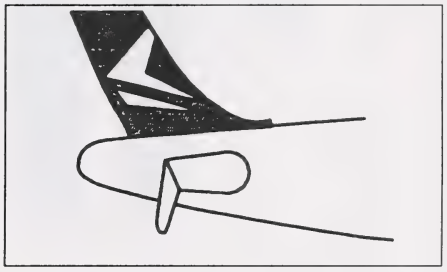


B.



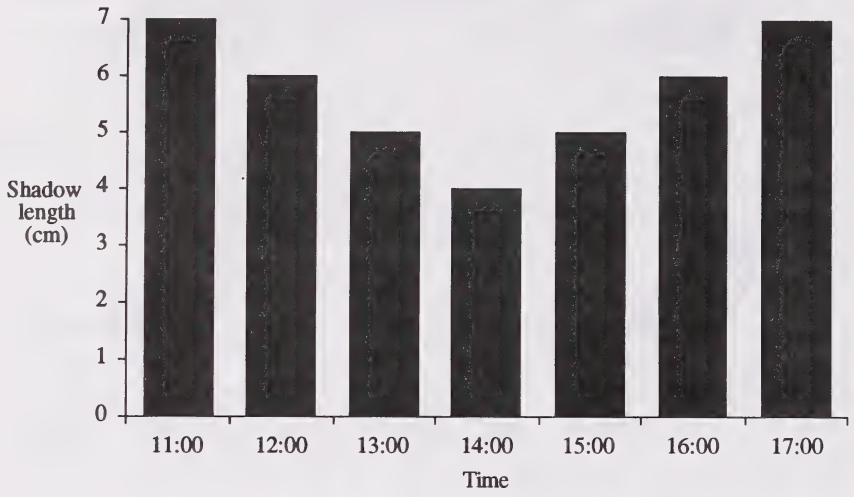
C.

D.



Use the following information to answer questions 8

One of the mechanics showed them a sundial that could be used to tell time. Daryl noticed a graph on the wall beside the mechanic's workbench.



8. The graph shows that on the day the mechanic recorded the results, the sun would have been farthest above the horizon at

A. 12:00
B. 13:00
C. 14:00
D. 15:00

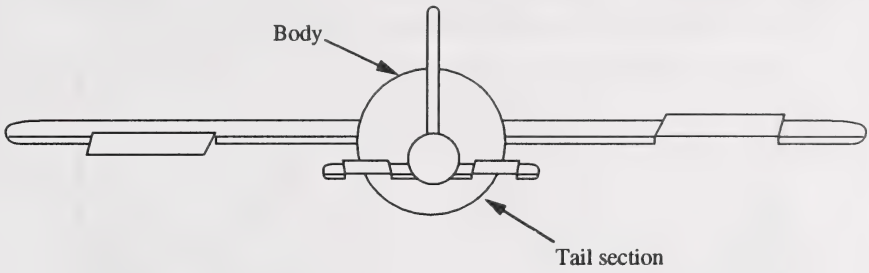
Once the tour was over, the family boarded the airplane they would fly in to Victoria.

9. While sitting in her seat, Cassandra saw a flock of seagulls flying nearby. She recalled that in order for either an airplane or a bird to fly,

A. thrust must be greater than drag
B. lift must be less than gravity
C. drag must equal lift
D. gravity must equal thrust

Use the following information to answer question 10.

From his seat, Daryl saw the rear view of an airplane just after it took off.

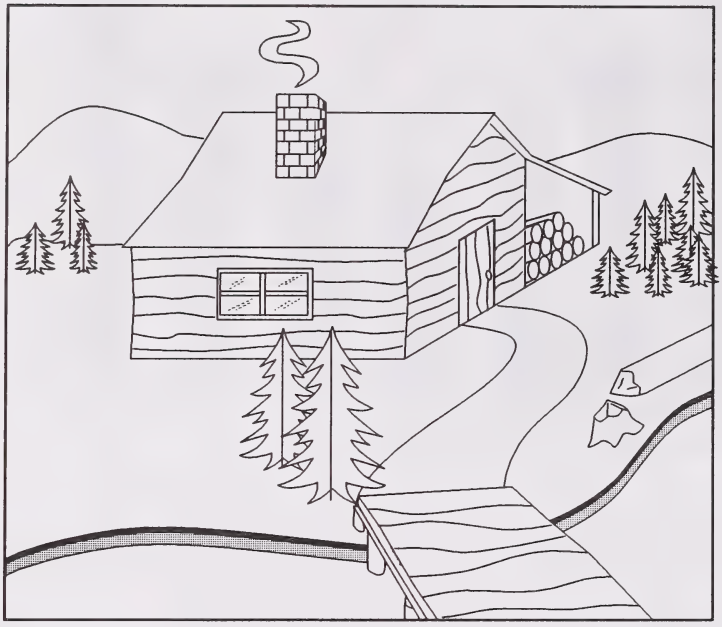


10. Daryl correctly predicted that the airplane will

A. climb and bank to the right
B. dive and bank to the left
C. climb and bank to the left
D. dive and bank to the right

Use the following information to answer question 11.

Their Uncle Jake met them at the airport in Victoria. They all jumped in Uncle Jake's van and headed to his cabin on the west side of the island. As they drove, Daryl removed a picture of the cabin from his wallet.

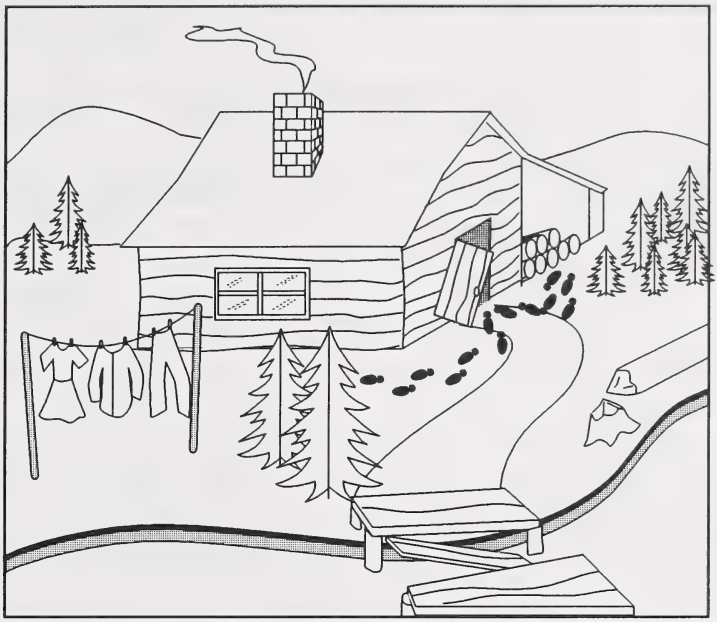


11. The **best** inference that Daryl can make from the photograph is that

A. wood is being used to heat the cabin
B. the weather is cold and windy
C. the cabin has no electricity or plumbing
D. there are fish in the stream

Use the following information to answer question 12.

When they arrived, Uncle Jake said that it looked like someone had broken into his cabin.



12. The evidence indicating that the damage was caused by humans was that

A. there was frost on the windows
B. there were footprints near the door
C. there were clothes on the line
D. a bridge was washed out

Uncle Jake called the RCMP and a detective came to the cabin. Detective West said that there had been other break-ins in the area lately. Detective West collected evidence and compared it to evidence he had collected from four suspects.

Use the following information to answer question 13.

Detective West analyzed soil samples from the scene of the crime along with samples of dirt found on the running shoes of four suspects. The table below summarizes what was found when the samples were analyzed.

	Particle Size	**Colour**	**Plant Material**	**Moisture Content**
Crime Scene	fine sand	light brown	weed seeds, grass; leaves	moist
Suspect I	fine dust	grey	leaves	dry
Suspect II	fine sand	light brown	grass blade	dry
Suspect III	fine sand	grey	none	dry
Suspect IV	coarse sand	dark brown	decaying leaves	moist

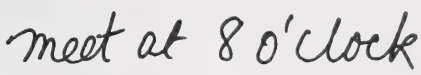
13. Based on this data, the **most probable** suspect is suspect

A. I
B. II
C. III
D. IV

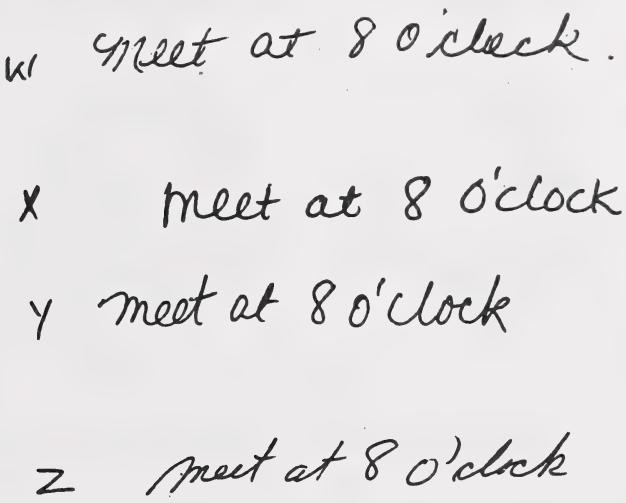
Use the following information to answer question 14.

Detective West compared the handwriting of a note found at the cabin to handwriting samples from the four suspects.

Note found at cabin:



Handiwriting samples from suspects:



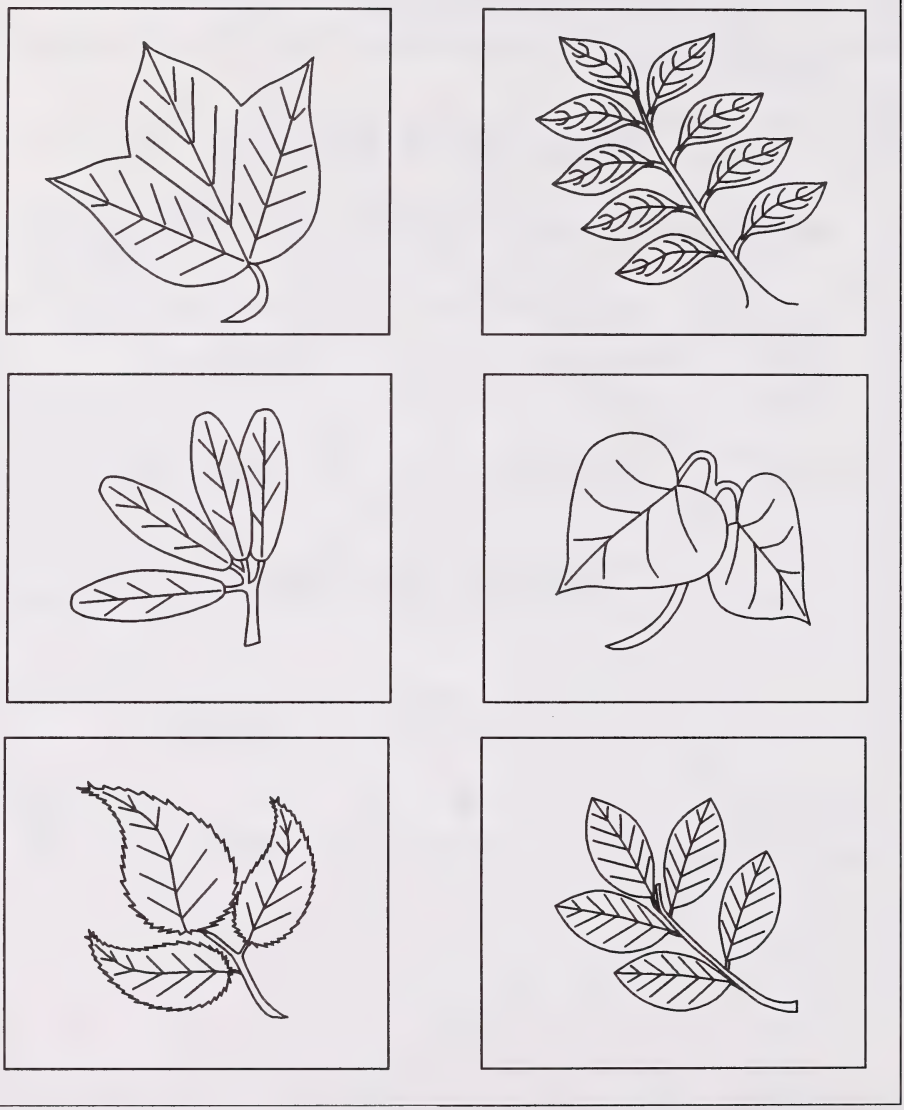
14. Based on this evidence, the writer of the note **most probably** is suspect

A. W
B. X
C. Y
D. Z

The next day, Uncle Jake took everybody for a hike to a local lumber mill.

Use the following information to answer question 15.

Along the way, Cassandra and Daryl collected these leaves.

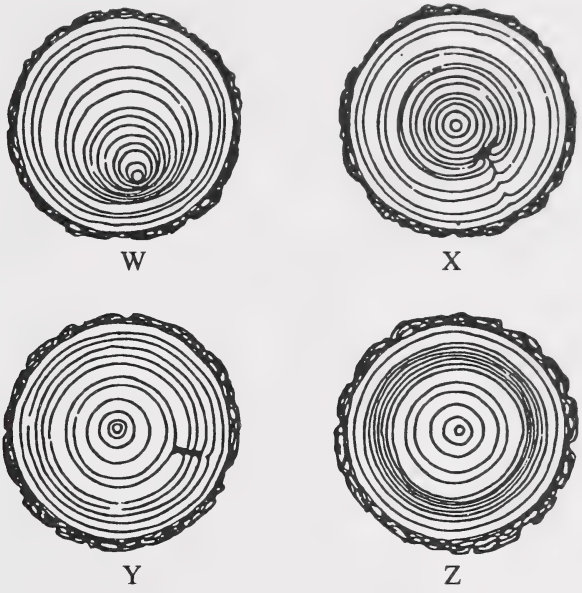


15. Cassandra noted that all of the leaves

A. are simple leaves
B. are compound leaves
C. come from coniferous trees
D. come from deciduous trees

Use the following information to answer question 16.

Uncle Jake showed Cassandra and Daryl the following cross sections of four trees.



16. The tree that shows evidence of drought is shown in cross section

A. W
B. X
C. Y
D. Z

17. Uncle Jake explained that all of the trees used by the lumber mill were coniferous. Cassandra knew that these trees have all of the following characteristics **except**

A. needle-like leaves
B. seeds in cones
C. large blossoms
D. scale-like leaves

18. Uncle Jake explained that the lumber company plants two or three seedlings for every tree they use. The **best** reason for this is that

A. not all seedlings survive
B. some seedlings grow faster than others
C. the seedlings grow better closer together
D. the seedlings will grow faster

Key and Descriptors for Practice Questions

Ques.	Key	Topic	Reporting Category	Curriculum Standard
1	C	Sky Science	Knowledge	Recognize bodies in space that are seen by reflected light
2	B	Flight	Skill	Apply the principle of air rising to hot-air balloon flight
3	C	Air and Aerodynamics	Knowledge	Recall that hot air rises
4	B	Air and Aerodynamics	Skill	Identify variables that must be held constant during a test for air compressibility
5	C	Flight	Knowledge	Identify the fuselage of an airplane
6	B	Flight	Skill	Apply Bernoulli's Principle to airplane wing design
7	B	Flight	Skill	Apply knowledge of horizontal stabilizers to airplane flight
8	C	Sky Science	Skill	Interpret a bar graph and apply knowledge of the angle of the sun
9	A	Air and Aerodynamics	Knowledge	Recognize that in order to fly, thrust must be greater than drag
10	A	Flight	Skill	Apply knowledge of horizontal stabilizer ailerons to airplane flight
11	A	Evidence and Investigation	Skill	Make an inference based on observations
12	B	Evidence and Investigation	Skill	Link evidence to a possible source
13	B	Evidence and Investigation	Skill	Analyze data to link evidence to a possible source
14	C	Evidence and Investigation	Skill	Analyze handwriting sample to identify the handwriting of a specific person
15	D	Trees and Forests	Skill	Identify deciduous trees from the characteristics of leaves
16	D	Trees and Forests	Skill	Interpret the growth pattern of a tree and infer the cause
17	C	Trees and Forests	Knowledge	Recognize characteristics of coniferous trees
18	A	Trees and Forests	Skill	Infer the survival of seedlings in a forest

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